

## Claims

1           1.     A computer-implemented method for monitoring variations in the film build  
2 thickness of workpieces on which a film build process has been performed, comprising  
3 the steps of:

4                   measuring the film build thickness of a group of workpieces, the  
5 group comprising at least two subgroups of workpieces, each subgroup including at  
6 least two workpieces;

7                   calculating the range of the film build thickness measurements of  
8 each subgroup, each range comprising the difference between the greatest thickness  
9 measurement and the least thickness measurement of the subgroup;

10                   selecting data from at least two of said subgroups having the  
11 smallest of the calculated ranges; and

12                   monitoring variations of the film build thickness of subsequent  
13 workpieces coated in the film build by processing the data from the selected subgroups.

14           2.     A method as defined in claim 1, including the step of calculating upper and  
15 lower control limits from the calculated ranges of the selected subgroups.

16           3.     A method as defined in claim 1, including the step of calculating upper and  
17 lower control limits for the film build process after each group of 20 subgroups has been  
18 measured.

1 4. A method as defined in claim 1, including the step of calculating upper and  
2 lower control limits after the film build thickness of each additional subgroup has been  
3 measured, and including the latest 20 subgroups for selecting the subgroups having the  
4 smallest of the calculated ranges.

1 5. A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces.

1 6. A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces that  
3 have been coated with a film in the same painting booth.

1 7. A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces that  
3 have been coated with a film in the same color group.

1 8. A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces that  
3 have been coated within the same time frame.

1 9. A method as defined in claim 1, including the step of calculating the  
2 change in quantity of film build material being used in the film build process by

3 substituting new process control limits for existing process control limits, the new  
4 process control limits having been calculated from the ranges of the selected  
5 subgroups.

1 10. A method as defined in claim 1, including the step of calculating the  
2 change in cost of film build material being used in the process by substituting new  
3 calculated process control limits for existing process control limits, the new process  
4 control limits having been calculated from the ranges of the selected subgroups.

1 11. A method as defined in claim 1, including the step of calculating  $C_{pk}$  based  
2 on the ranges of the selected subgroups.

1 12. A method as defined in claim 1, including the step of calculating a film  
2 build average thickness from data selected from the selected subgroups.

1 13. A method as defined in claim 9, including the steps of calculating the  
2 difference in  $C_{pk}$  for the new process control limits and the existing process control  
3 limits, and then calculating the change in film build material usage from the difference in  
4  $C_{pk}$ .